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Original Article

Body Mass Index Class Is Independently Associated With Health-Related Quality of Life After Primary Total Hip Arthroplasty: An Institutional Registry-Based Study

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ABSTRACT

Background: The purpose of this study was to compare the health-related quality of life (HRQoL) of patients across World Health Organization (WHO) body mass index (BMI) classes before and after total hip arthroplasty (THA).
Methods: Patients with end-stage hip osteoarthritis who received elective primary unilateral THA were identified through an institutional registry and categorized based on the World Health Organization BMI classification. Age, sex, laterality, year of surgery, and Charlson-Deyo comorbidity index were recorded. The primary outcome was the EQ-5D-3L index and visual analog scale (EQ-VAS) scores at 2 years postoperatively. Inferential statistics and regression analyses were performed to determine associations between BMI classes and HRQoL.
Results: EQ-5D-3L scores at baseline and at 2 years were statistically different across BMI classes, with higher EQ-VAS and index scores in patients with lower BMI. There was no difference observed for the 2-year change in EQ-VAS scores, but there was a statistically greater increase in index scores for more obese patients. In the regression analyses, there were statistically significant negative effect estimates for EQ-VAS and index scores associated with increasing BMI class.
Conclusion: BMI class is independently associated with lower HRQoL scores 2 years after primary THA. While absolute scores in obese patients were lower than in nonobese patients, obese patients enjoyed more positive changes in EQ-5D index scores after THA. These results may provide the most detailed information on how BMI influences HRQoL before and after THA, and they are relevant to future economic decision analyses on the topic.

Total hip arthroplasty (THA) has been widely accepted as a reliable and effective surgical intervention for treating osteoarthritis (OA) of the hip after failed conservative management [1]. Obesity is an independent and modifiable risk factor for both OA and also the subsequent need for THA [2-6]. While OA has been shown to negatively impact health-related quality of life (HRQoL), affecting sleep, mood, and functioning in social and recreational activities [7] and providing the basis for the benefit of THA, the associations between obesity and HRQoL before and after THA are not well characterized. Prior outcome studies have revealed mixed results in determining whether quality of life before and after THA differs by BMI class [2].

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This study received institutional review board approval prior to initiation.

Work was performed at the Hospital for Special Surgery, New York, NY.

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Accurate measurement of HRQoL is particularly important for determining the societal impact of both hip OA and also THA. As the healthcare environment becomes more cost-conscious, healthcare interventions will be forced to demonstrate their cost-effectiveness to society in order to allocate limited resources efficiently. By definition, the determination of cost-effectiveness requires consideration of both costs and also patient preference–based HRQoL [8,9]. One of the commonest standardized measures of generic HRQoL is the EuroQol-5D 3 level (EQ-5D-3L) instrument, which permits assessment and comparison of health state utilities regardless of patient conditions or disease treatments [9,10].

The purpose of this study was to describe how the HRQoL in patients with advanced hip OA before and after THA differs according to World Health Organization (WHO) BMI class, using the EQ-5D-3L instrument. This study asked the following questions: (1) How does increasing BMI impact HRQoL preoperatively and at 2 years postoperatively for patients undergoing THA? (2) How does increasing BMI affect changes in these scores following THA? and (3) What are the effects of other demographic variables (ie, age, sex, year of surgery, and comorbidity index) on HRQoL before and after THA?

Patients and Methods

Study Design and Subjects

Through an institutional review board (IRB)-approved THA registry, all patients who underwent an elective primary unilateral THA between May 1, 2007, and December 31, 2009, were reviewed. All THA were performed at a single, high-volume, orthopedic specialty hospital. Patients were eligible for study inclusion if hip OA was the primary diagnosis, and they underwent primary unilateral THA, gave consent to participate in the registry, and had completed preoperative and 2-year follow-up surveys. Patients with secondary diagnoses of dysplasia, inflammatory arthritis, avascular necrosis, posttraumatic arthritis, fracture, or preoperative deformity were excluded. Patients who were converted from a partial hip replacement, hip resurfacing, or other prior hip surgery to a THA were excluded. Patients who underwent revision or contralateral THA before completing the 2-year follow-up survey, or reported having complications on their 6-month adverse event survey were excluded. Complications collected on the 6-month adverse event survey included pulmonary embolism, deep vein thrombosis, infection around the joint, major bleeding, pneumonia, stroke, myocardial infarction, dislocation, fracture, and requirement for additional surgery on the hip that was replaced. Finally, patients for whom BMI data or EQ-5D responses were unavailable or incomplete were excluded. Patients included in the study predominantly received THA through a posterior approach and were allowed to be weight-bearing as tolerated with posterior hip precautions for 6 weeks postoperatively. Precautions were relaxed after 6 weeks. Implants were based on surgeon preference but predominantly included noncemented femoral and acetabular fixation. A total of 2733 patients met criteria for inclusion in this study (Fig. 1). Of note, at the time of enrollment for this cohort, surgical approach was not included as a registry variable. One registry surgeon may have used the direct anterior approach rather than the posterior approach, and his case volume accounted for 1.79% of the cases reported in this study. However, several studies have shown that surgical approach for THA is not relevant for 2-year postoperative outcomes [11-13]. Therefore, his patients were included in this analysis.

Data

Preoperative BMI was calculated using height and weight information extracted from the hospital electronic medical record at admission. Patients' self-reported heights and weights collected preoperatively were used in lieu of electronic BMI when the information in the electronic health record was missing or out of valid physiologic range (<14 kg/m^2 or >60 kg/m^2). Patients were divided into 6 categories based on the WHO's established BMI classification: Underweight (<18.50 kg/m^2), normal weight (18.50-24.99 kg/m^2), overweight (25.00-29.99 kg/m^2), obese class I (30.00-34.99 kg/m^2), obese class II (35.00-39.99 kg/m^2), and obese class III (≥40.00 kg/m^2). In addition to BMI, patient characteristics were collected at baseline, including age at the time of index THA procedure, sex, laterality, year of surgery, and Charlson-Deyo comorbidity index (CDI).

The primary outcome measure, EQ-5D-3L, was collected at baseline preoperatively and at 2-year follow-up and consisted of a self-assessment questionnaire (EQ-5D index) and a visual analog

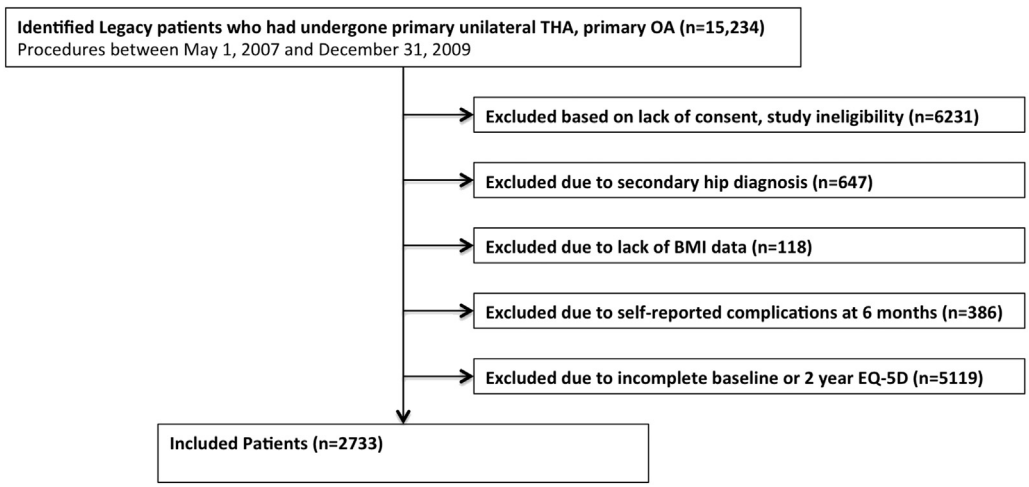

Fig. 1. Flowchart presenting the formation of the final included patient cohort—For a primary diagnosis of hip osteoarthritis (OA), 15,234 registry patients were identified who had undergone primary unilateral total hip arthroplasty (THA). Of those, patients were excluded because of lack of consent/ineligibility for study (n = 6231), secondary hip diagnosis (n = 647), lack of body mass index (BMI) data (n = 118), self-reported complications at 6-month adverse event survey (n = 386), and incomplete baseline and/or 2-year EQ-5D (n = 5119), leaving 2733 patients in the final study cohort.